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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/809,974	03/26/2004	Shang-Chih Chen	67,200-1258	7904

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EXAMINER	
QUACH, TUAN N	
ART UNIT	**PAPER NUMBER**
2826	

DATE MAILED: 10/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/809,974	CHEN ET AL.	
	Examiner	Art Unit	
	Tuan Quach	2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 July 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-42* is/are pending in the application.

4a) Of the above claim(s) *1-21* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *22-42* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

The amendment filed July 21, 2005 has been received. Claims 22-31, 33, 36, 38-40 are amended. New claims 41 and 42 are added.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 22-26, 28, 29, 39-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Parker et al.

Regarding claim 22, Parker et al. 6,787,440 B2 teach a buffer layer 105 and a high-k dielectric layer 110 under gate 120 wherein the buffer can be either below or above the high-k dielectric, column 2 line 55 to column 4 line 55, wherein the buffer 210 is formed on the high-k dielectric 205 followed by formation of gate layer 220. Note the limitation recited in claim 22 regarding the buffer layer comprising dopants selected from the group consisting of a metal, a semiconductor, and nitrogen would be met or anticipated by the teaching in Parker et al., column 2 lines 34-38 and wherein reduced voltage threshold, e.g., claim 22 preamble, claims 23 and 24, would follow or alternatively obvious, absent evidence to the contrary as the buffer dielectric including the material claimed is employed, e.g., as in claims 28-29, silicon oxynitride, silicon dioxides and suitable materials, e.g, column 2 lines 35-38 supra, are employed. Regarding claims 39 and 40, the various high k dielectric enumerated in these claims are met given the teachings in Parket et al., column 2 lines 55-63. Alternatively, official notice is given regarding any suitable materials enumerated in the claims and not delineated in the reference. Note that the inclusion of the interfacial layer, e.g.,

amended claims 25, 26, and new claim 41, would have been met or obvious as corresponding to the buffer being below the high K dielectric as delineated and such would have been obvious and advantageous as delineated above, column 2 lines 24 et seq. for separation with the substrate, column 5 lines 9-17, including the materials as claimed in claim 26; alternatively, such list of materials claimed would have been obvious and within the purview of one skilled in the art given the teachings of Parker et al. above. Additionally, the inclusion of a semiconductor substrate, e.g., claim 41 and claim 42, would have been met or otherwise obvious taught in Parker et al., e.g., column 2 lines 1-33.

Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Parker et al. taken with either Dimmler et al.

Regarding claim 27, Parker et al. is applied above but does not explicitly recite the dielectric constant value claimed. Dimmler et al. 2004/0057319 A1 teach buffer dielectric including high dielectric constant. See [0035], claims 8-11.

It would have been obvious to have selected the desired dielectric constant since such is conventional and advantageous as evidenced by Dimmler et al.

Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Parker et al. in view of Tseng et al.

Parker et al. is applied as above and does not recite the decreasing concentration.

Tseng et al..5,464,792 teaches buffer layer including decreasing concentration to improve integrity and durability of the underlying dielectric 14. See the abstract, column 2 line 51 to column 5 line 15.

It would have been obvious to one skilled in the art in practicing the above invention to have included the concentration gradient as delineated since such is conventional and advantageous as evidenced by Tseng et al.

Claims 31-38 and rejected under 35 U.S.C. 103(a) as being unpatentable over Parker et al. taken with Nishikawa et al. or Dimmler et al. and Kim et al. or Xiang.

Parker et al. is applied as above and does not explictly recite metals dopant.

Nishikawa et al. 2004/0096692, [173], teaches the inclusion of metal dopants, e.g., Ce, in the buffer layer wherein high dielectric constant buffer layer can be obtained.

Dimmler et al. 2004/0057319 A1 also teaches buffer dielectric employing high dielectric constant materials thus permitting the desired dielectric constant.

Kim et al. 6,727,130 teaches the various high dielectric constant materials including dielectric materials such Al203, HfSiO2 can be employed in gate insulating layer including formation in PMOS and NMOS devices. See column 56 lines 62 to column 6 line 18.

Xiang 6,734,527 teaches CMOS devices including gate materials such as hafnium silicates, aluminum oxide and their applications in MOS devices including NMOS and PMOS devices. See column 4 lines 7 to column 6 line 37.

It would have been obvious to one skilled in the art to have included metal dopants in the above invention since such is conventional and advantageous as

evidenced by Nishikawa et al. and Dimmler et al. to obtain desired high dielectric constant and to take advantage of the conventional high dielectric constant materials including metal dopants delineated in Kimm et al. and Xiang. It would have been obvious and would have been a matter of routine optimization to select the appropriate dopant amounts as in claim 33. Regarding claim 34 and 35, the selection of desired metals would have been conventional and obvious given the materials delineated above in Nishikawa et al., Kim et al., and Xiang; additionally, it would have been obvious and within the purview of one skilled in the art to have selected the suitable equivalent materials enumerated in claim 34. It would have been obvious to have employed such dielectric materials including hafnium oxide and aluminum oxide as in claims 35-38 in the dielectric materials since such is conventional and advantageous including obtaining high dielectric constant for the buffer dielectric since such corresponds to well known high dielectric materials and wherein the use of buffer including high dielectric constant materials is conventional and advantageous as shown in Dimmler et al. above. It would have been obvious and would have been within the purview to one skilled in the art to have employed such materials to form NMOS and PMOS devices, respectively, e.g., as in claims 36, 37, since such applications are well known and obvious as evidenced by Kim et al. and Xiang as delineated above.

Applicant's arguments filed July 21, 2005 have been fully considered but they are not persuasive.

Applicant argues that Parker et al. does not teach the buffer material as claimed. Nonetheless, applicant has failed to point out how the claimed materials would

distinguish over the materials taught in Parker et al. which would encompass the claimed materials. Applicant further argues that Dimmler, Kim et al., and Xiang do not the claimed invention. Nonetheless, applicant has failed to take into consideration that Dimmler et al. teaches buffer dielectric employing high dielectric constant materials thus permitting the desired dielectric constant. Additionally, Kim et al. teaches the various high dielectric constant materials including dielectric materials such Al203, HfSiO2 can be employed in gate insulating layer including formation in PMOS and NMOS devices. See column 56 lines 62 to column 6 line 18. Moreover, Xiang teaches CMOS devices including gate materials such as hafnium silicates, aluminum oxide and their applications in MOS devices including NMOS and PMOS devices. See column 4 lines 7 to column 6 line 37. Accordingly it remains that the laundry list of materials enumerated by applicant's claims would have been well within the purview of one skilled in the art, including metal dopants in the above invention since such is conventional and advantageous as evidenced by Nishikawa et al. and Dimmler et al. to obtain desired high dielectric constant and to take advantage of the conventional high dielectric constant materials including metal dopants delineated in Kimm et al. and Xiang. And since applicant has failed to show any criticality regarding the recitation of such laundry list of various conventional materials. It would have been obvious and would have been a matter of routine optimization to select the appropriate dopant amounts.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Tuan Quach whose telephone number is 571-272-1717. The examiner can normally be reached on M-F from 8:30 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor Nathan Flynn, can be reached on 571-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tuan Quach
Primary Examiner